Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1.-25. (Cancelled)

26. (Currently Amended) A method of providing an antenna pattern corresponding to a plurality of antenna elements of a circular array antenna, said method comprising the steps of:

selecting an arbitrary beam width and an arbitrary beam direction for said pattern; ~~and~~

calculating integral limits for estimating excitation coefficients of a linear array based on said selected beam width and beam direction;

calculating said excitation coefficients;

transforming said calculated excitation coefficients into excitation coefficients of a circular array; and

providing said antenna pattern corresponding to said plurality of antenna elements of said circular array antenna according to said selected arbitrary beam width and arbitrary beam direction~~.~~,

wherein said antenna pattern is provided based upon said excitation coefficients of said circular array.

27. (Cancelled)

28. (Previously Presented) The method of claim 26, wherein at least one of the arbitrary beam direction and the arbitrary beam width for said pattern are determined from incoming radio waves estimated in relation to traffic conditions.

29. (Previously Presented) The method of claim 26, wherein at least one of the beam direction and the beam width for said pattern are selected from preset values.

30. (Cancelled)

31. (Currently Amended) A method of providing an antenna pattern according to claim ~~30~~26, wherein said excitation coefficients are calculated by a Fourier series.

32. (Currently Amended) A receiving system for use with a plurality of antenna elements of a circular array antenna, said receiving system comprising:

a calculator for establishing an antenna pattern corresponding to said plurality of antenna elements of said circular array antenna by calculating excitation coefficients for a linear array antenna based upon an arbitrary beam width and an arbitrary beam direction, and transforming said calculated excitation coefficients into excitation coefficients of a circular array antenna; and

a pathway for effecting signals obtained by use of said circular array antenna based on said established antenna pattern corresponding to said plurality of antenna elements.

33. (Previously Presented) The receiver of claim 32, further comprising:

a receive frequency converter for converting the radio frequency signals received by the circular array antenna to either intermediate frequency signals or baseband signals,

wherein either the intermediate frequency signals or the baseband signals are multiplied by coefficients calculated by said calculator, respectively, to form resultant signals, and

wherein the resultant signals are combined.

34. (Previously Presented) A receiver comprising:

a circular antenna comprising a plurality of antenna elements disposed circularly;

a coefficient calculator for calculating excitation coefficients for the circular array antenna based on a beam direction and a beamwidth of a desired antenna pattern;

a receive frequency converter for converting radio frequency signals received by the circular array antenna to either intermediate frequency signals or baseband signals; and

a plurality of receive beam formers, each of the receive beam formers for respectively multiplying either the intermediate frequency signals or the baseband signals by the coefficients calculated by the coefficient calculator and combining resultant signals,

wherein the receive beam formers are coupled in parallel to the receive frequency converter,

wherein the coefficient calculator is commonly coupled to the receive beam formers, and

wherein the coefficient calculator comprises means for setting the number of beams which is equal to the number of receive beam formers.

35. (Previously Presented) A receiver comprising:

a circular array antenna comprising a plurality of antenna elements disposed circularly;

a coefficient calculator for calculating excitation coefficients for the circular array antenna based on a beam direction and a beamwidth of a desired antenna pattern;

a plurality of receive frequency converters, each of the receive frequency converters for converting radio frequency signals received by the circular array antenna to either intermediate frequency signals or baseband signals; and

a plurality of receive beam formers, each of the receive beam formers for respectively multiplying either the intermediate frequency signals or the baseband signals by the coefficients calculated by the coefficient calculator and combining resultant signals,

wherein the receive frequency converter and the receive beam former are coupled in parallel to the circular array antenna,

wherein the coefficient calculator is coupled to the receive beam formers, and

wherein the coefficient calculator comprises means for setting the number of beams which is equal to the number of receive beam formers.

36. (Previously Presented) The receiver of claim 34, wherein the coefficient calculator comprises means for setting an antenna power of each of the beams.

37. (Previously Presented) The receiver of claim 35, wherein the coefficient calculator comprises means for setting an antenna power of each of the beams.

38. (Previously Presented) The receiver of claim 32, further comprising:

an arrival direction estimating unit for estimating arrival directions of incoming radio waves in relation to traffic conditions; and

a statistical processor for statistically processing outputs of the arrival direction estimating unit to determine the beam direction and the beamwidth.

39. (Previously Presented) The receiver of claim 32, further comprising:

a storage unit for previously storing the beam direction and the beamwidth,

wherein the beam direction and the beamwidth are read from the storage unit.

40. (Currently Amended) A transmitting system for use with a circular antenna, said transmitting system comprising:~~;~~

a calculator for establishing an antenna pattern corresponding to a plurality of antenna elements of said circular array antenna by calculating excitation coefficients for a linear array antenna based upon an arbitrary beam width and an arbitrary beam direction, and transforming said calculated excitation coefficients into excitation coefficients of a circular array antenna; and

a pathway for effecting signals to be propagated by use of said circular array antenna based on said established antenna pattern corresponding to said plurality of antenna elements.

41. (Previously Presented) The transmitter of claim 40, further comprising:

a transmit beam former for splitting a transmit signal into signals, the number of which is the same as the number of antenna elements of the circular array antenna, and respectively multiplying the signals by the coefficients thereby to form transmit beams,

transmit frequency converter for converting the transmit beams of the transmit beam former to either intermediate frequency signals or baseband signals,

wherein the circular array antenna is excited by either the intermediate frequency signals or the baseband signals of the transmit frequency converter.

42. (Previously Presented) A transmitter comprising:

a circular array antenna comprising a plurality of antenna elements disposed circularly;

a coefficient calculator for calculating excitation coefficients for the circular array antenna based on a beam direction and a beamwidth of a desired antenna pattern;

a plurality of transmit beam formers, each of the transmit beam formers for splitting a transmit signal into signals, the number of which is the same as the number of antenna elements of the circular array antenna, and respectively multiplying the signals by the coefficients thereby to form transmit beams; and

a transmit frequency converter for converting the transmit beams of each of the transmit beam formers to either intermediate frequency signals or baseband signals,

wherein the transmit beam formers are coupled in parallel to the transmit frequency converter,

wherein the coefficient calculator is commonly coupled to the transmit beam formers, and

wherein the coefficient calculator comprises means for setting the number of beams which is equal to the number of transmit beam formers.

43. (Previously Presented) A transmitter comprising:

a circular array antenna comprising a plurality of antenna elements disposed circularly;

a coefficient calculator for calculating excitation coefficients for the circular array antenna based on a beam direction and a beamwidth of a desired antenna pattern;

a plurality of transmit beam formers, each of the transmit beam formers for splitting a transmit signal into signals, the number of which is the same as the number of antenna elements of the circular array antenna, and respectively multiplying the signals by the coefficients thereby to form transmit beams; and

a plurality of transmit frequency converters, each of the transmit frequency converters for converting the transmit beams of the corresponding transmit beam former to either intermediate frequency signals or baseband signals,

wherein the combinations of the transmit frequency converter and the transmit beam former are coupled in parallel to the circular array antenna,

wherein the coefficient calculator is commonly coupled to the transmit beam formers, and

wherein the coefficient calculator comprises means for setting the number of beams which is equal to the number of transmit beam formers.

44. (Previously Presented) The transmitter of claim 42, wherein the coefficient calculator comprises means for setting an antenna power of each of the beams.

45. (Currently Amended) The transmitter of claim ~~4843~~, wherein the coefficient calculator comprises means for setting an antenna power of each of the beams.

46. (Previously Presented) The transmitter of claim 40, further comprising:

an arrival direction estimating unit for estimating arrival directions of incoming radio waves in relation to traffic conditions; and

a statistical processor for statistically processing outputs of the arrival direction estimating unit to determine the beam direction and the beamwidth.

47. (Previously Presented) The transmitter of claim 40, further comprising:

a storage unit for previously storing the beam direction and the beamwidth,

wherein the beam direction and the beamwidth are read from the storage unit.

48. (Previously Presented) A radio unit for use with

a circular antenna having a plurality of antenna elements disposed circularly, said radio unit comprising:

a calculator for establishing an antenna pattern of said circular antenna based on at least one of an arbitrary beam direction and an arbitrary beam width of a desired antenna pattern;

a receive frequency converter for converting radio frequency signals received by the circular antenna to either intermediate frequency signals or baseband signals;

a receive beam former for respectively multiplying either the intermediate frequency signals or the baseband signals by coefficients calculated by the coefficient calculator and combining resultant signals;

a transmit beam former for splitting a transmit signal into signals, the number of which is the same as the number of antenna elements of the circular array antenna, and respectively multiplying the signals by the coefficients thereby to form transmit beams; and

a transmit frequency converter for converting the transmit beams of the transmit beam former to either intermediate frequency signals or baseband signals,

wherein the calculator is commonly coupled to the receive beam former and the transmit beam former.

49. (Previously Presented) The radio unit of claim 48, further comprising:

an arrival direction estimating unit for estimating arrival directions of incoming radio waves in relation to traffic conditions; and

a statistical processor for statistically processing outputs of the arrival direction estimating unit to determine the beam direction and the beamwidth.

50. (Previously Presented) The radio unit of claim 48, further comprising:

a storage unit for previously storing the beam direction and the beamwidth,

wherein the beam direction and the beamwidth are read from the storage unit.